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ABSTRACT

After a brief review of the literature the research proposal focuses on the comparative effectiveness of non-verbal positive reinforcement vs. verbal negative reinforcement in the reduction of self-inflicted injury on 23 elementary age autistic children. In the two phase study each child would be paired by age, sex, length of time in school, developmental placement, verbal communication level, and presence of handicap: one child in each pair receiving positive (the other negative) reinforcement in phase one, and reversed in phase two. The children are to be observed for 10 days, 3 times a day, by two different observers, scoring observed head hitting behavior. A 12 step procedure is outlined, methods of data analysis are proposed, and a time schedule and budget are included. (PHR)

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THE COMPARATIVE EFFECTIVENESS OF POSITIVE REINFORCEMENT VERSUS NEGATIVE VERBAL REINFORCEMENT IN THE TRAINING OF AUTISTIC CHILDREN TO AVOID SELF-INFLICTED INJURY

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RESEARCH PROPOSAL

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THE COMPARATIVE EFFECTIVENESS OF POSITIVE REINFORCEMENT VERSUS NEGATIVE VERBAL REINFORCEMENT IN THE TRAINING OF AUTISTIC CHILDREN TO AVOID SELF-INFLICTED INJURY

INTRODUCTION

Autistic children need appropriate reinforcement to enable them to break out of their private personal world of inner thoughts. The teacher of autistic children is daily called upon to answer a very practical question: "Should I YELL or SMILE at this child in response to the behavior I am now observing?" The answer to this challenging question must be based upon the best information available. This research proposal is an attempt to provide impartial empirical data in answer to this question.

STATEMENT OF THE PROBLEM

The purpose of this study is to investigate the comparative effectiveness of the use of positive non-verbal reinforcement versus the use of negative verbal reinforcement with autistic children. Effectiveness will be measured by the reduction of self-inflicted injury. An example of non-verbal reinforcements would be signs of approval. An example of negative verbal reinforcement would be saying "No" to the autistic child.

REVIEW OF RELATED LITERATURE

Autism was first described by Leo Kanner (1944) and subsequently also by Eisenberg (Eisenberg and Kanner, 1956), both of whom distinguished it from childhood schizophrenia. Kanner's original criteria are still accepted today as milestones to recognize the following symptoms of autism in children: (a) a profound inability to relate to other people, (b) an insistence on the preservation of sameness and an inability to tolerate change, (c) abnormalities in language development, and (d) stereotyped mannerisms. These characteristics make it difficult for an autistic children to learn in school and for an autistic adult to acquire gainful employment. However, autistic children can be trained for jobs (Brown, 1978). The attainment of gainful employment by formerly autistic children is a long voyage composed of many small steps, among the first of which is the acquisition of enough motivation to respond to appropriate reinforcements given by teachers.

This first step is not easy. Both by self-stimulation (for example, the tongue on the roof of the mouth) and by self-inflicted injury (such as head hitting), autistic children have developed habits of distraction that effectively block out lessons taught by teachers (Koegel and Covert, 1972). Koegel and Covert suppressed self-stimulation by saying "No!" and by slapping the child's hands, but their study did not investigate the best way to suppress self-stimulation and self-inflicted head hitting.

Foxx and Azrin (1973) tested five methods of suppressing self-stimulation in two autistic girls: (a) free reinforcment such as candy given periodically regardless of the child's behavior; (b) reinforcement for non-mouthing such as praise and candy given contingent upon no mouthing for ten seconds; (c) punishment such as a slap on the thigh contingent upon self-stimulation; (d) distasteful but non-harmful liquid solutions with a bitter taste; and (e) over-correction such as telling the child "No!" and then brushing the child's teeth, gums, and lips with a bad tasting antiseptic solution. The over-correction method was clearly the most efficient procedure for both girls in the experiment.

This conclusion establishes that extreme negative reinforcement can extinguish self-stimulation. However, it does not answer another question it raises, "Is the cure worse than the malady?" The above research should not be faulted for small sample size. Research with autistic children has involved small samples (for example, ten to twelve children) and short observation periods (one to two minutes) because of the low incidence of this handicap in the general population (Prieto and Zucker, 1978). The fault lies elsewhere.

Negative reinforcement can damage an autistic child. The ego of the autistic child is brittle and cannot overcome a barrage of negative reinforcement. The child then withdraws into a private world to avoid punishment (Susz, 1978). The development of the autistic child and normal child is marked with critical time periods, that is, periods of developmental crises when the wrong

reinforcement at the wrong time can result in intense, long-lasting relapses (Roy, 1978).

Practically speaking, regardless of its alleged effectiveness, punishment has not been found manageable in a group instructional setting. One reviewer of related research concluded that very few studies have investigated procedures for teaching a group of autistic children in a classroom (Haring, 1974). To maintain behaviors learned on a one-to-one basis and to learn new behaviors in a group setting, autistic children require reinforcements that are more manageable than food and candy in a classroom setting (Koegel and Rincover, 1973). Thus, both punishment and candy are not panaceas.

A specialist in dealing with children who manifest autistic behavior (Safford, 1978) has enunciated one principle: "Effective intervention is based on systematic analysis of the child's overt behavior." This systematic analysis has been interpreted to mean that specific target behaviors must be identified, recorded as they occur, and quantified as base line data (Haring, 1974). At this point, the teacher can assume control by testing a variety of reinforcing contingencies in the autistic child's environment.

Autistic children require systematic reinforcement to acquire appropriate responses to basic words and labels such as "No!" (Lovaas, 1977). With tangible reinforcements, behavior changes are achievable. After such behavior changes occur, verbal commands such as "No!" may take on more meaning. To achieve desirable behavior changes, signed speech instruction and signed positive reinforcement offers promise in helping autistic children learn oral speech with which they can learn much more in school (Alarcon, 1977).

SUMMARY OF THE REVIEW OF THE LITERATURE

Autistic children have special needs which dominate their perceptions and reactions. In a way, autism colors their individual learning styles. Punishment has been found to be a quick and short lived reinforcer. Positive reinforcement is definitely long term but effective in helping learning success for autistic children. Several methods have been tested and scaled as far as effectiveness is concerned. Specifically, timing has been found as effective as the reinforcer selected. Even if it were effective in the long run, punishment is not manageable in a group instructional setting. Effective intervention must be based upon systematic analysis of the child's overt behavior.

IMPLICATIONS OF THE REVIEW OF THE LITERATURE

Many claims have been made but never documented or tested. For example, punishment can be shown effective, but further analysis reveals it is also destructive of the young personality already in developmental difficulties. Positive reinforcement is uniformly praised, but further analysis reveals that much positive reinforcement goes unnoticed if the autistic child has not learned to pay attention or to use basic verbal speech for communication.

Target behaviors must be selected with care to provide meaningful data. Base line data must be collected to provide meaningful comparisons. Allegedly weak reinforcers must be carefully investigated to derive meaningful results.

An observable target behavior must be selected with care in order to provide objectives and unambiguous data (Gelfand and Hartmann, 1975). To provide statistical control with a small sample or with an individual case study, base line data must be collected before the application of the experimental variables.

A specialist in the training of autistic children (Ferster, 1967) reported that the strongest reinforcing stimuli for autistic children are food, candy, and ice cream. The same specialist reported that reinforcers such as a smile or adult approval are weak. These allegedly weak reinforcers need further investigation. This is the mission undertaken by the proposed research stated in the following hypothesis.

STATEMENT OF THE HYPOTHESIS

The following null hypothesis will be investigated : There is no significant difference between the effect of positive non-verbal reinforcement on the diminution of physical self-inflicted injury and between the effect of negative verbal reinforcement on the diminution of physical self-inflicted punishment when the subjects are autistic children in a special education setting.

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METHOD

Description of Subjects

The sample for this investigation will be selected from the 23 autistic children enrolled in the ungraded elementary program at the Parson School for emotionally disturbed children in Albany, New York.

This residential school is located in a middle class urban neighborhood approximately one mile from downtown Albany. It is next door to Albany Junior College, the Capital District Psychiatric Center, Albany Medical Center, Veterans' Hospital, the New York State Health Department, and the New York State Department of Mental Health, which formerly included the New York State Department of Developmental Disabilities. In short, the school is near an abundant support system.

Twenty of the autistic children will be placed in matched pairs and then randomly assigned to either the positive non-verbal treatment or to the negative verbal treatment in phase one. In phase two, each individual will be assigned to the other treatment the individual did not receive in phase one.

The pairs will be matched on the following variables: age, sex, length of stay at Parson School, developmental placement in instructional program, verbal communication level as reported by teachers, and non-handicapped or multi-handicapped condition.

Description of Instrument

A coded tally sheet was selected as the data gathering instrument for this study. This instrument was developed by following the guidelines given by L. R. Gay (Educational Research, 1976, pp. 138-141), by Thomas N. Stephens (Directive Teaching, 1970, pp. 61-108), and by Donna M. Gelfand and Donald P. Hartman (Child Behavior: Analysis and Therapy, 1975, pp. 229-250).

The form provides for ten days of observation for each child. Three separate observations are made each day. Each observation must be made by two different observers using individual copies of the identical form. The form specifies the exact beginning time of each observation as well as the duration of each observation.

A tally mark is used to record each observed incident of head hitting. Zero is used to record no heading observed whatsoever.

AB is used to record absence of the child for a particular observation period. PR is used to indicate that the child was physically restrained for a particular observation period.

The scoring of the instrument results in the following summary data:

1. Total count of observed head hitting.
2. Total count of observation periods that resulted in the total count of head hitting. Absences, physical restraints, and observer differences can reduce the number of observations to below thirty.
3. Total counts of head hitting for each of the following three observation times:
   A. Just after meals.
   B. Between meals.
   C. Just before meals.
4. Average count of head hitting for each of the above time references.

Each child will be observed by two observers using the above instrument (a) to observe ten days of baseline data, (b) to observe ten days of positive non-verbal reinforcement, and (c) to observe ten days of negative verbal reinforcement. Ten day doublechecked totals will be available for analysis of each of the above.

These data are in a form to facilitate t-test comparisons between means for each subtotal.

Description of Experimental Design

The design selected for this study was the matched pair design combined with the baseline pretest -- posttest -- posttest control group design. The baseline pretest is collected for 10 days without positive or negative reinforcement. The first posttest data concern the results of positive non-verbal reinforcement The second posttest data concern the results of negative verbal reinforcement.

It is to be noted that in phase one, half of the group gets the positive reinforcement while the other half of the group gets the negative reinforcement. In phase two, assignment to positive and negative reinforcement is reversed.

This design was selected because of the need to match all students in the total population. The development of matched pairs provides for random assignment to the control group (negative reinforcement) and to the experimental group (positive reinforcement). In addition, this experimental design provides for a double control group comparison without the need to collect extra data or to spend extra money.

In the first group comparison, the control group is based upon the baseline pretest while the experimental group is based upon the positive reinforcement posttest.

In the second group comparison, the control group is based upon the baseline pretest while the experimental group is based upon the negative reinforcement posttest.

Here is the way the experimental design would be summarized according to the symbols found in Gay (op. cit., pp. 178-181):

$$\begin{array}{ccccc} O & X_1 & O & X_2 & O \\ \hline O & X_2 & O & X_1 & O \end{array}$$

The broken lines separating the groups indicate that the groups are not randomly formed but are matched pairs. Each member is assigned to the top line or bottom line randomly.

The first "O" on each line refers to the baseline pretest data.

The X_1 on each line refers to the positive reinforcement treatment.

The X_2 on each line refers to the negative reinforcement treatment.

The second "O" and the third "O" on each line refer to the posttest following each treatment.

The reasons for this choice of experimental design are obvious. This matched pair design combined with pretest -- posttest -- posttest control group design helps avoid several sources of internal and external invalidity.

This experimental design provides for the following comparisons:

- Baseline data versus positive reinforcement data.
- Baseline data versus negative reinforcement data.
- Positive reinforcement data versus negative reinforcement data.

Procedures

1. Ten matched pairs must be formed from the available 23 students.

2. Difficult matches must be resolved by randomly assigning students to matched pairs based upon ranks. Gay describes this procedure on pages 158, 174, and 253 (op. cit.).

3. Approximately 120 copies of the evaluation form must be printed in addition to enough copies to be used during observer training.

4. Eight observers must be trained to use the form and to make objective observations.

5. The trained observers must be checked for reliability and validity during fieldtest observations.

6. The baseline data must be collected for ten days.

7. The matched pairs must be assigned to either positive or negative reinforcement.

8. The first posttest data must be collected for ten days.

9. The matched pair assignments to positive or negative reinforcement must be reversed.

10. The second posttest data must be collected for ten days.

11. The means for each group must be determined for each treatment as well as for the baseline data.

12. To find out if the differences in means are significant and at what level of significance, t-tests must be performed.

Data Analysis

By definition, nonindependent samples are samples formed by some type of matching. (Gay, op. cit., explains this on p. 253.) Several principles emerge based upon this definition:

A. The ultimate match occurs when the two samples are really the same group(s) at two different times.

B. When samples are nonindependent, the error term of the t test tends to be smaller.

C. Therefore, there is a higher probability that the null hypothesis will be rejected.

D. Since the scores may be correlated, the special t test for nonindependent samples must be used.

The data will be formated and analyzed as explained by Gay, op. cit., on pages 261-263.

The t test will be performed on the following comparisons:

- Baseline data versus positive reinforcement data.
- Baseline data versus negative reinforcement data.
- Positive reinforcement data versus negative reinforcement data.

Time Schedule

ACTIVITY	COMPLETION DATA
1. Form ten matched pairs of students	1. September 7, 1979
2. Resolve difficult matches randomly	2. September 8, 1979
3. Print 120 copies of evaluation form	3. September 13, 1979
4. Train eight observers	4. October 3, 1979
5. Validate observations of fieldtest	5. October 19, 1979
6. Collect baseline data for 10 days	6. November 2, 1979
7. Assign matched pairs to treatments	7. November 17, 1979
8. Collect first posttest data	8. November 30, 1979
9. Reverse assignments to treatment	9. December 1, 1979
10. Collect second posttest data	10. December 12, 1979
11. Determine means for each treatment	11. December 15, 1979
12. Perform t test for nonindependent samples (as described by Gay, op. cit., p. 253)	12. December 23, 1979

Budget

ACTIVITY	PERSONNEL	MATERIALS	TRAVEL	LINE TOTALS
1.	$225	$15	$40	$280
2.	75	--	--	75
3.	--	20	--	20
4.	240	40	160	440
5.	100	30	40	170
6.	250	5	--	255
7.	20	--	--	20
8.	250	5	--	255
9.	20	--	--	20
10.	250	5	--	255
11.	75	45	--	120
12.	150	35	10	195
COLUMN TOTALS	$1655	$200	$250	$2105

TOTAL BUDGET = $2105